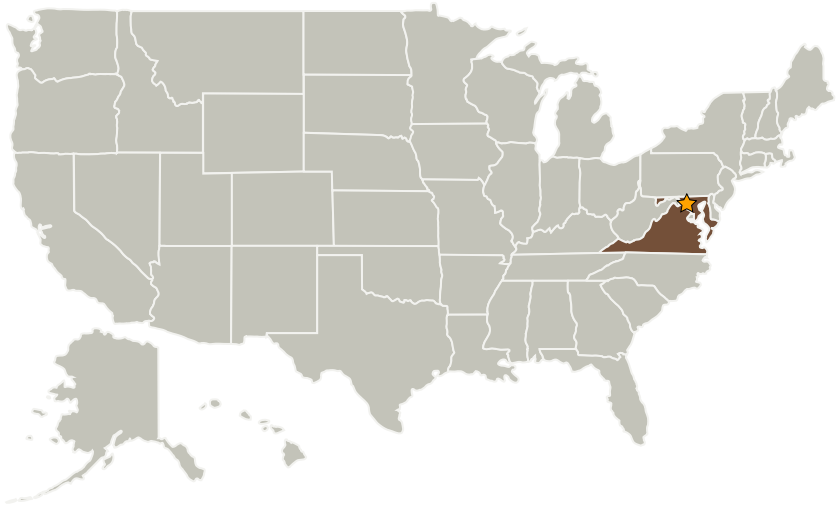
An all MMIC Replacement for Gunn Diode Oscillators, Phase I

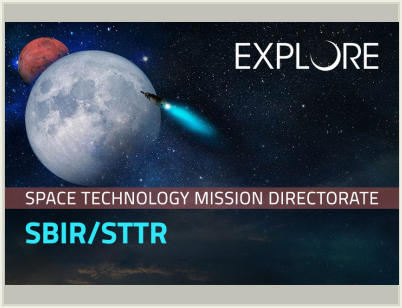
Completed Technology Project (2004 - 2004)

Project Introduction

We propose to replace the Gunn Diode Oscillators (GDOs) in NASA?s millimeter- and submillimeter-wave sensing instruments. Our new solution will rely on modern and reliable microwave integrated circuit technology. Specifically our systems will use highly developed microwave oscillators to achieve a low noise and highly stable reference signal in the 10 ? 30 GHz band. Compact amplifiers based on commercial MMIC chips will then increase the signal strength. Finally, our innovative integrated varactor multiplier circuits will be used to increase the frequency to the 60 ? 150 GHz frequency band with high efficiency and minimal added phase noise. With this technology we expect to achieve phase noise and stability comparable to the best Gunn diode oscillators and fundamentally improved output power and frequency agility. The millimeter-wave integrated circuit process and diode technologies are the critical innovative technologies that are required for this research. Through this SBIR project these innovative technologies will be extended to achieve highly compact multipliers for the 60 ? 150 GHz band. These new multipliers will be integrated with highly developed microwave components to achieve a robust and cost efficient replacement for the GDOs presently used in NASA?s Earth Science program.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Virginia Diodes, Inc.	Supporting Organization	Industry	Charlottesville, Virginia

Primary U.S. Work Locations	
Maryland	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

David M Porterfield

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.2 Radio Frequency
    - TX05.2.7 Innovative RF Technologies